Torticollis – Trainer: Therapy principle and importance of physiotherapy
Basics: Pathophysiological findings in cervical dystonia (CD) which formed the basis for visual biofeedback therapy

- Primary vestibular dysfunction in CD (Bronstein 1986, 1989, Vacherot 2007)
- Probable additional secondary vestibular dysfunction in patients with CD (Huygen 1989)
- Pathological processing of neck muscle afferents in CD (Lekhel 1997)
- Disturbed postural vertical in patients with CD (Anastasopoulos 1997)
- Disturbed visual vertical in patients with CD (Anastasopoulos 1997)
- Disturbed dynamic balance control in patients with phasic CD (Mueller 1999) without improvement following successful Botulinum Toxin injections (Mueller 2001)
- Impaired perception of body orientation resulting from disturbed neck muscle afferents in CD (Bove 2004)
- Disturbance of egocentric spatial perception in patients with CD (Mueller 2005)

→ Treatment goal: Improvement of eye-head-coordination
Visual biofeedback treatment of torticollis with a portable and easy-to-use personal training device

(Mueller et al. 2008 Movement Disorders Congress)

Methods:

• 12 patients with torticollis (tonic N=3, phasic N=9)
• Minimum 12 weeks after the last botulinum toxin injection
• 6 weeks of regular visual biofeedback – Training (minimum 3 training sessions / week)
• Outcome measures: Tsui-score, CDQ-24, Pain [VAS 0-10], poly-EMG
Torticollis - Trainer

hinge joint / swivel head for vertical positioning of laser beam

laser beam
Torticollis
Trainer
Exercice 1

**Position**: Seat with back. The laser is pointed to a wall. Stay about 1-2 meters away from the wall.

**Movement**: Move the dot alternately left and right on a horizontal line.

**Note**: Choose a movement size you can do easily. Try also to vary the speed.
Exercice 4

Position: Seat with back
Movement: With the dot, draw a circle.
Note: Try big and small circles alternately. Start the movement clockwise and/or counterclockwise. Choose a movement size you can do easily. Try also to vary the speed.
Standing  
Standing on one leg only  
Stepping on the spot/walking
## Results

<table>
<thead>
<tr>
<th></th>
<th>Baseline (mean ± SD)</th>
<th>Follow-up (mean ± SD)</th>
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<tbody>
<tr>
<td>Tsui-score</td>
<td>11±6</td>
<td>4 ± 2 *</td>
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<tr>
<td>CDQ-24</td>
<td>50.6 ± 26.4</td>
<td>24.9 ± 28.6 *</td>
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<tr>
<td>Neck pain [0-10]</td>
<td>6.0 ± 2.5</td>
<td>2.5 ± 2.9 *</td>
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<tr>
<td>EMG area under the curve (μVs)</td>
<td>1.4 ± 1.2</td>
<td>1.0 ± 1.1 *</td>
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* p<0.05
Poly-EMG example before and after 6 weeks of visual biofeedback therapy

Baseline

6 weeks

TPR = trapezius right
TPL = trapezius left
SMR = sternocleido right
SML = sternocleido left
SPR = splenius right
SPL = splenius left
Physiotherapy and Torticollis trainer

- Initial instruction by a physiotherapist very useful
- Subsequent self-training by the patient with regular evaluation by a physiotherapist
- Torticollis training is also very effective in small groups guided by an experienced physiotherapist
Further indications for laser-based biofeedback-training

- Neglect following Stroke
  - Visual stimuli or
  - Neck muscle vibrations

with positive effect on Neglect after Stroke (Luauté 2006)

- Successful repetitive optokinetic stimulation with active smooth pursuit eye movements in patients with neglect (Kerkhoff 2006)
Further indications for laser-based biofeedback-training

- Post-stroke Pusher-syndrome – pathophysiology:
  - Disturbance of body perception in relation to gravity
  - Intact processing of visual + vestibular afferents
  - Treatment goal: visual control of upright position
  → Visual feedback-therapy to train awareness for the center and the vertical axis of the body
Good luck with your Torticollis-Training!